APPENDIX

1. (Twice Amended) A method of forming a layer of metal on a substrate, comprising:

i) depositing a seed layer of the metal on a first substrate surface which is Ti, said seed layer being sufficient to cover said first substrate surface which is Ti at a substrate temperature of from 220 to 300°C;

ii) depositing a second amount of metal on said seed layer at a substrate temperature and power that are sufficient to (i) inhibit formation of filamentous metal phases having a resistivity greater than that of said metal, and (ii) provide a metal diffusion rate and a metal deposition rate sufficient to inhibit void formation in an opening having an aspect ratio of at least 2.0; and

iii) depositing a third amount of metal on said second amount of metal.

2. The method of Claim 1, wherein said substrate further comprises an opening.

3. The method of Claim 2, further comprising, before step i) forming a barrier/liner layer in said via channel.

4. The method of Claim 3, wherein step ii) is conducted at a substrate temperature and power sufficient to inhibit formation of filamentous metal phases with said barrier/liner layer, having a resistivity greater than that of said metal.

5. The method of Claim 1, wherein said second amount of metal is deposited at a rate of about 5 to 30 Å/sec.

6. The method of Claim 1, wherein said second amount of metal is deposited at a pressure of 4 to 6 mtor.

7. The method of Claim 1, wherein said second amount of metal is deposited at a substrate temperature of 300 to 420°C.

8. The method as in Claim 1, wherein said second amount of metal is deposited to form a layer of 400 to 3,000 Å thick.

9. The method as in Claim 1, wherein said metal is aluminum.

10. The method as in Claim 1, said seed layer is deposited at a power of 9,000 W.

11. The method of Claim 1, wherein said seed layer is deposited at a pressure of 1 to 3 mtorr.

12. The method of Claim 1, wherein said seed layer is deposited at a rate of 100 to 300 Å/sec.

13. The method of Claim 1, wherein said seed layer is deposited to form a layer of 500 to 4,000 Å.

14. The method of Claim 1, wherein heating of said substrate in said second step is by backside gas flow.

15. The method of Claim 14, wherein said gas is Ar.

16. The method of Claim 2, wherein said opening has an aspect ratio of at least. 3:1 (W/H).

17. The method of Claim 2, wherein said second amount of metal deposited is sufficient to fill said opening.

18. The method of Claim 2, further comprising forming a liner/wetting layer is deposited in said opening before step i).

19. The method of Claim 1, wherein said second amount of metal is deposited at a power of 100 to 800 W.

20. The method of Claim 2, wherein said opening has an aspect ratio of at least 2.5 (W/H).

22. (Amended) A method of forming a layer of aluminum-containing metal on a substrate, comprising:

i) depositing a first amount of a metal comprising aluminum on a seed layer of the metal, said seed layer being sufficient to cover a substrate surface comprising titanium, at a substrate power sufficient to inhibit formation of a phase of $TiAl_3$ having a resistivity greater than that of said metal said seed layer of metal being deposited at a substrate temperature of from 220 to 300°C; and

ii) depositing a second amount of metal on said first amount of metal.

23. The method of claim 22, wherein said first amount of said metal is deposited at a metal diffusion rate and a metal deposition rate sufficient to inhibit void formation in an opening having an aspect ratio of at least 2.0.

24. (Amended) A method of forming a layer of aluminum-containing metal on a substrate, comprising:

i) depositing a first amount of a metal comprising aluminum on a seed layer of the metal, said seed layer being sufficient to cover a substrate surface, at a substrate power sufficient to inhibit formation of a phase containing said metal having a resistivity greater than that of said metal and at a metal diffusion rate and a metal deposition rate sufficient to inhibit void formation in an opening having an aspect ratio of at least 2.0 said seed layer of metal being deposited at a substrate temperature of from 220 to 300°C; and

ii) depositing a second amount of said metal on said first amount of metal.